



August 14, 2023

Mr. Ken Barker  
Barker Law Firm, LLC  
P.O. Box 100  
Belle Fourche, SD 57717  
Via email: kbarker@barkerlawfirm.com

## CLARK FIRE EXPERT DISCLOSURE REPORT

Dear Mr. Barker:

Jensen Hughes was retained by Barker Law Firm, LLC to investigate the wildfire fire incident that occurred on November 15, 2021 in Clark, Wyoming. Pursuant to your request, Jensen Hughes has prepared the attached expert disclosure report. If you have any questions concerning this report, please contact me at (206) 909-8126.

Respectfully submitted by:

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Respectfully reviewed by:

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**WILLIAM JEROME RUTH, INDIVIDUALLY,  
AND AS WRONGFUL DEATH REPRESENTATIVE OF  
THE ESTATE OF CYNTHIA SHOOK RUTH**

**V.**

**BEARTOOTH ELECTRIC COOPERATIVE, INC., ET AL.**

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF WYOMING**

**CIVIL ACTION NO.: 22-CV-230**

REPORT DATE: AUGUST 14, 2023  
JENSEN HUGHES FILE NO. 1A3917001

Report Prepared by:

A handwritten signature in black ink, reading 'Paul T. Way'.

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Paul T. Way, PE, CFI, CFEI  
Technical Fellow, Electrical Engineering  
Jensen Hughes

Technical Review by:

A handwritten signature in black ink, reading 'Sam Shuck'.

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Sam Shuck, PE, CFEI  
Senior Electrical Engineer, Forensics  
Jensen Hughes



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## 1.0 EXECUTIVE SUMMARY

A fire occurred at 197 Louis L'Amour Lane in Clark, Wyoming on November 15, 2021. The fire was caused by contact between a tree on the property and an electric distribution line owned by Beartooth Electric Cooperative, Inc. (BEC). Limbs of the tree were found to be well within BEC's vegetation clearance distance requirements. BEC had recently hired Asplundh to trim and clear vegetation in the area; however, Asplundh chose not to trim the subject tree based on a visual inspection performed from outside the property at a distance of approximately 300 feet. Contact between the subject tree and distribution line occurred during a windstorm and caused the ignition of woody material in the crown of the tree. Embers produced by that ignition then blew downwind which ignited lightweight ground fuels. The resulting fire became known as the Clark Wildfire.

## 2.0 BACKGROUND

### Property of Origin

#### **Property Layout**

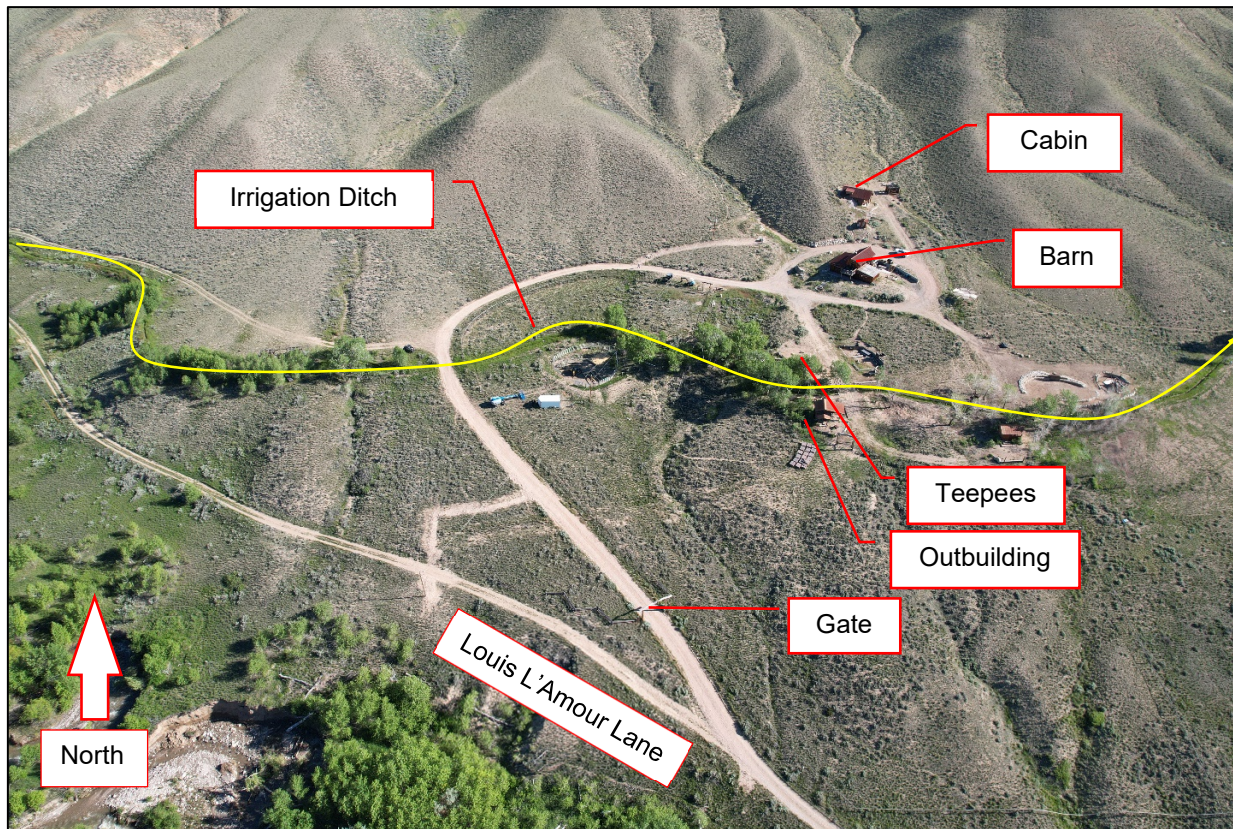
The fire occurred at 197 Louis L'Amour Lane in Clark, Wyoming. The property, shown in Figure 1, had been owned by Scot and Gretchen Hutton since 2004. The Huttons used the property as a site for a church camp called "Be There Ranch." In normal conversation, they referred to the property as "the camp."

The site had no permanent residents; however, Pam Nelson acted as the camp steward between May 2017 and September 2022. While acting in this role, Ms. Nelson was on the property nearly every day. Ms. Nelson lived in the "steward's cottage" on a nearby property at 157 Louis L'Amour Lane, which was also owned by the Huttons. This property was commonly called "centermost."

Entry to the camp was located on the south side of the property where Louis L'Amour Lane forked, and a dirt road passed a gateway arch made from wooden posts. The camp did not have a full gate across the entry road. The dirt road then looped clockwise around the property where it circled a barn. An apartment was built above the barn for housing camp staff in addition to the cabin that was located north of the barn.

An irrigation ditch ran from west to east, bisecting the camp. A grove of trees grew in the general vicinity of the ditch. There were two cleared spaces on the north side of the grove that were teepees used during camp activities. An outbuilding, sometimes referred to as the 12-by-12, stood nearby on the south side of the ditch.

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**Figure 1 - Aerial view of the camp with callouts.**

### Property Electrical

Electrical power throughout Clark, Wyoming was supplied by Beartooth Electric Cooperative, Inc. (BEC) from the Belfry Substation.<sup>1</sup> The portion of utility line that ran along Line Creek and Louis L'Amour Lane was referred to as the Line Creek Tap. Other BEC lines within Clark included the Canyon Tap and the Tolman Tap. The Line Creek Tap operated at 7.2 kilovolts line-to-neutral and powered transformers in the area which, in turn, supplied electricity to the nearby properties.

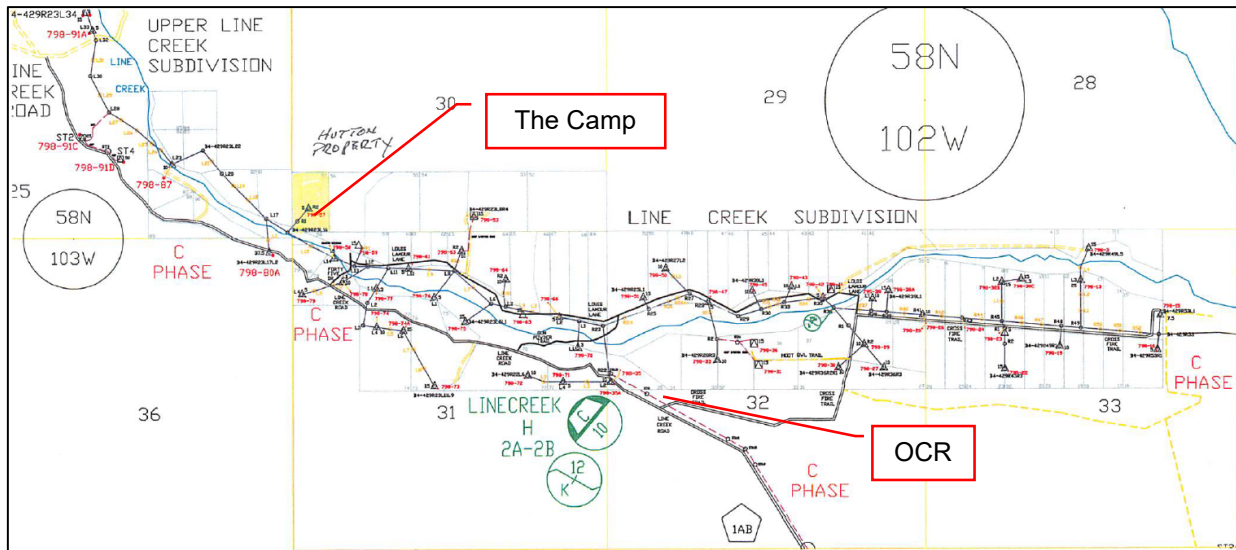
The Line Creek Tap was protected by an Oil Circuit Recloser (OCR). An OCR is specialized type of oil filled circuit breaker located in strategic locations to provide protection and isolation ability of segments of distribution lines. These devices are typically located at the tops of conductor support poles. In their depositions, neither Kevin Owens or Eric Elton, of BEC, knew what the OCR's trip setting were, and they stated that those settings were handled by a third-party engineering firm.<sup>2,3</sup>

<sup>1</sup> March 15, 2023 deposition of Kevin Owens 295:02

<sup>2</sup> March 15, 2023 deposition of Kevin Owens 300:17

<sup>3</sup> May 13, 2023 deposition of Eric Elton 274:21

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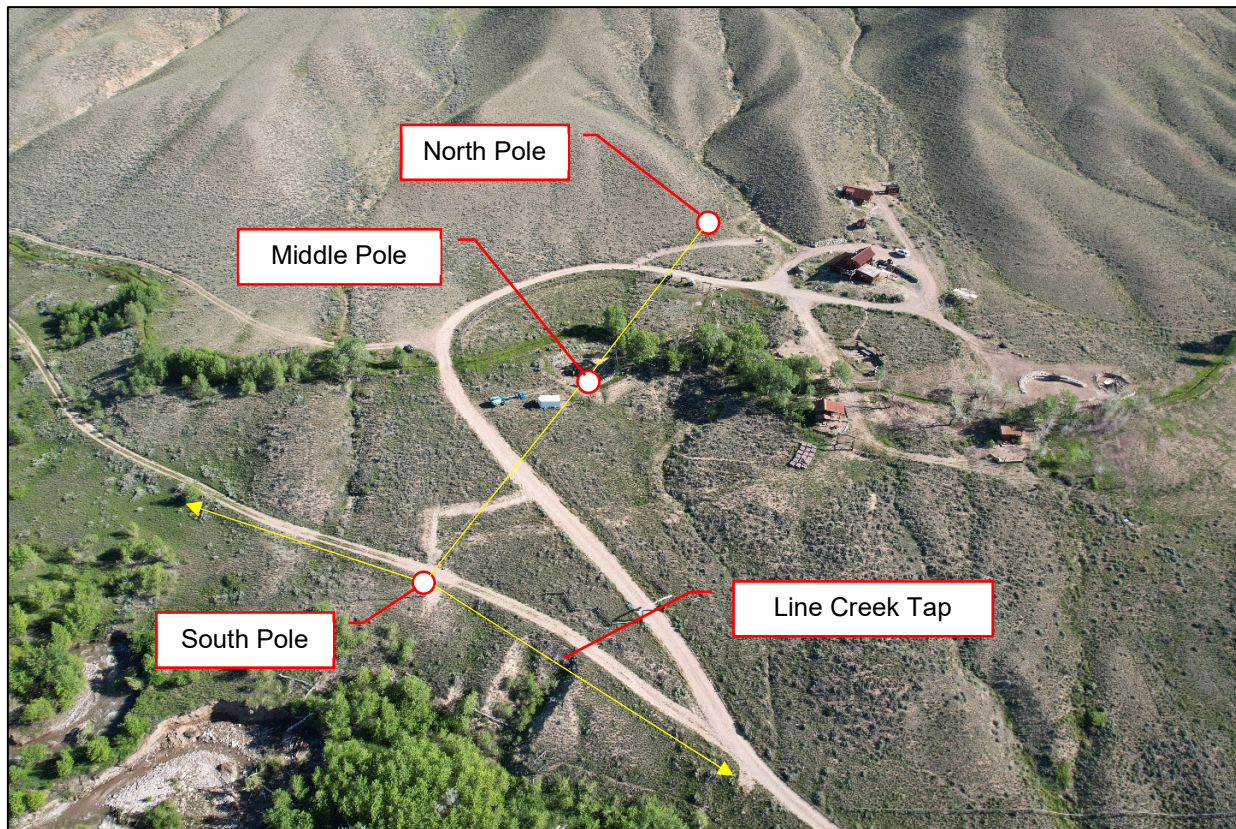
**Figure 2 - Line Creek Tap diagram with callouts for the camp property and the OCR location.<sup>4</sup>**

The camp had an electric distribution line that branched from the Line Creek Tap to feed a pole-mounted 120/240 volt transformer that provided power to the property. From the main tap that ran along Louis L'Amour Lane, the distribution line ran northward suspended by two utility poles on the camp property. The distribution line is shown in Figure 3. For the purposes of this report, the utility poles will be referred to as the north, middle, and south pole.

<sup>4</sup> OCR location per Exhibit 66



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**Figure 3 - Aerial view of the camp, with the electrical distribution lines highlighted.**

The south pole, which is part of the main Line Creek Tap, held its two conductors in a vertical orientation. The line conductor, with a voltage of 7.2 kilovolts (kV), was on top, and the neutral conductor was on the bottom. The middle pole held the conductors in a horizontal orientation, with the line conductor on the east side and the neutral conductor on the west side. Finally, the north pole held the conductors in a vertical orientation. Here again, the line conductor was above the neutral. These conductors connected to the transformer that was mounted on the north pole.



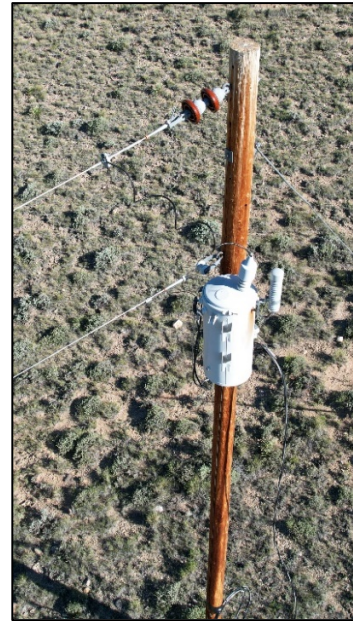
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**Photograph 1 - South utility pole**



**Photograph 2 - Middle utility pole**



**Photograph 3 - North utility pole**

### **Subject Tree**

The tree that would eventually come into contact with BEC's distribution line was located within the camp property on the west side of the grove of trees that grew along the south side of the irrigation ditch. The tree was a cottonwood and was about 35 feet tall with a crown of about 35 feet in diameter. For the purposes of clarity, this report will refer to this tree as the "subject tree."



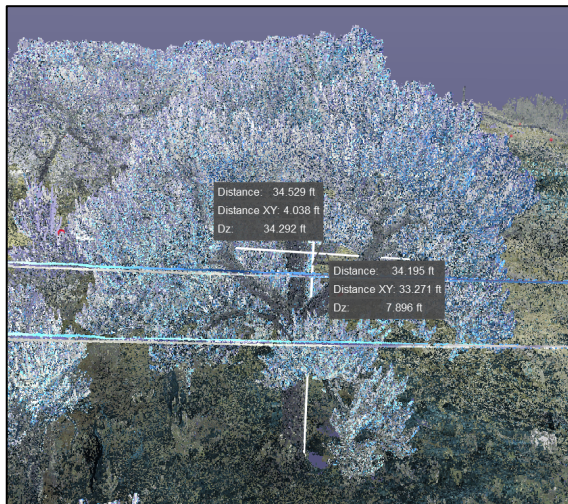
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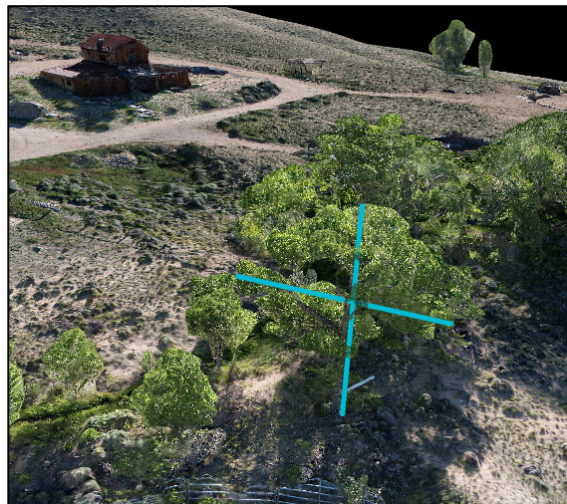
**Figure 4 – Subject tree looking north.**



**Figure 5 – Subject tree looking east.**



**Figure 6 - Tree height and diameter measurements via LiDAR**



**Figure 7 - Photogrammetric model from drone photos.**

The subject tree showed signs of prior trimming on branches that grew in the vicinity of the BEC distribution line. Growth around the wounds suggested that this trimming had occurred many years prior to the fire. BEC did not have any records of when this trimming may have occurred; however, they believed that it would have been part of line clearing efforts and may have been performed by Davey during their work in 2014.<sup>5, 6</sup>

<sup>5</sup> May 13, 2023 deposition of Eric Elton 86:22

<sup>6</sup> May 13, 2023 deposition of Eric Elton 256:02

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LiDAR scanning was performed at the Hutton property on April 20, 2022, and portions of the subject tree's crown were measured to be 3.5 feet away from the distribution line's phase conductor.<sup>7, 8</sup> Following the fire, it became apparent that at least one of the limbs that came into contact with the line eventually severed. Twigs found near the outbuilding had areas of discoloration that were consistent with utility line contact, as shown in Photograph 5. Pam Nelson also estimated that the tree had lost a number of limbs during the course of the windstorm.<sup>9</sup> In all, it is clear that portions of the subject tree's crown were closer to the distribution line prior to the fire than what was measured afterwards.



**Photograph 4 - "DSC06115" Taken by IRIS on November 18, 2023, showing the east side of the outbuilding.**



**Photograph 5 - "DSC06116" Taken by IRIS on November 18, 2023, showing twigs with small areas of burning.**

### **Day of the Fire**

The fire occurred around 10:30 p.m. on November 15, 2021. Pam Nelson had been working on and around the property all day. Since the sunrise had been particularly beautiful that morning, Ms. Nelson had decided to take a series of photographs to document her work that day. Her first photo was of the sunrise taken at 6:53 a.m. from the centermost property.<sup>10</sup> Throughout the day, Ms. Nelson traveled back and forth between the camp and centermost along the irrigation ditch that ran between the properties across the Linebaugh property. Ms. Nelson's work on and around the property lasted until around 5:00 p.m. when she returned home to the steward's cabin. She went to bed around 8:30 p.m. and slept until she was awakened by light from the fire that was visible on the window shades in her bedroom.<sup>11</sup>

Throughout the day, Ms. Nelson was the only person on the camp property. Ms. Nelson stated that she had never dealt with trespassers or unexpected guests at the camp property.<sup>12</sup> The centermost property has a view of the camp property, and Ms. Nelson never saw any signs of other people or vehicles at the camp.

<sup>7</sup> GPRS 0001 – GPRS 0029

<sup>8</sup> GPRS 0016

<sup>9</sup> March 13, 2023 deposition of Pam Nelson 98:01

<sup>10</sup> G Hutton 0014

<sup>11</sup> March 13, 2023 deposition of Pam Nelson 37:20

<sup>12</sup> March 13, 2023 deposition of Pam Nelson 25:13



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Around 8:00 p.m., a windstorm passed through Clark and much of the surrounding area in Wyoming and Montana. Winds at the camp property were estimated to be between fifty (50) and sixty (60) miles per hour, with gusts around 85 mph.<sup>13</sup> The winds generally followed Line Creek from west to east.

Around 10:30 p.m., Melvin King was walking his dog on his property at 986 Road 1AB, which is about half a mile (.5 mi) to the west of the fire's specific origin area.<sup>14,15</sup> He was looking eastward when he saw a small fire on the camp property. At that time, Mr. King estimated the fire to be around two (2) to three (3) feet in diameter.<sup>16</sup> He thought the fire was about the size of a campfire; however, he did not see any people on the property,<sup>17</sup> nor did he see any other lights on the property.<sup>18</sup> By the time he alerted his wife and they went back outside, Mr. King said that the fire had grown to something around one hundred times the size of what he had originally witnessed.<sup>19</sup>

### 3.0 SITE AND EVIDENCE INSPECTIONS

Jensen Hughes attended the following joint-party inspections:

- June 16, 2022 – Joint-party site inspection at 197 Louis L'Amour Lane, Clark, WY
- April 11, 2023 – Joint-party evidence laboratory inspection at 3773 S Jason St #2, Englewood, CO
- June 12, 2023 – Joint-party evidence laboratory inspection at c
- July 27, 2023 – Joint-party evidence laboratory inspection at 3773 S Jason St #2, Englewood, CO
- August 14, 2023. Defense expert Steve Day examined certain evidence at 3773 S Jason St #2, Englewood, CO. It was Jensen Hughes understanding that other evidence items were going to be examined further at Golden Forensics by Mr. Day.

During these inspections, Jensen Hughes collected and analyzed data relevant to the causation of the Clark Wildfire.

#### June 16, 2022 Joint-Party Site Inspection

Jensen Hughes attended a joint-party site inspection on June 16, 2022 at the Hutton residence located at 197 Louis L'Amour Lane in Clark, Wyoming. Table 1 shows a list of items that were collected during the inspection.

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<sup>13</sup> WERTH 0001 – WERTH0024

<sup>14</sup> March 13, 2023 deposition of Melvin King 6:02

<sup>15</sup> Specific origin area as determined per the report by Alan Carlson

<sup>16</sup> March 13, 2023 deposition of Melvin King 9:22

<sup>17</sup> March 13, 2023 deposition of Melvin King 11:24

<sup>18</sup> March 13, 2023 deposition of Melvin King 19:06

<sup>19</sup> March 13, 2023 deposition of Melvin King 19:20

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**Table 1 - List of items collected from the June 16, 2022 joint-party site inspection.**

Item Number	Description
1	Tree Branch with Burn on End
2	Ash Bucket Can
3	9' Section of Conductor w/ Possible Staining White Tape South Wnd-White & Red Tape on North End, sectioned.
4	9' Section of Conductor w/ Possible Staining White Tape South Wnd-White & Red Tape on North End.
5	Section of Conductor w/ Possible Staining Blue Tape South End-Blue and Green Tape on North End.
6	Phase Conductor Coiled from Transformer to North End of E-4 South End Green Tape
7	from E-8 South to Intersection Pole
8	Phase Conductor and Insulator from Pole South of Subject Tree
9	Tree Branch SW side of Tree Canopy, Possible Resistance Heat Tracking on 2+ stems
10	Tree Branch Bundle, One Branch Missing Leaves, Budding Visible
11	Limb with Possible Char on it. Three stubs of Missing Branches

During the site inspection, the following relevant observations were made:

1. The subject tree had sprouted leaves for the season on nearly all of its branches. One branch, shown in Figure 8, that was located on the side of the crown facing the distribution line had not sprouted leaves. This branch would later be collected as part of Item #10 (E-10), as seen in Photograph 9.

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**Figure 8 - Crown of the subject tree, showing the branch without leaves and measurements A and B.**

2. The phase conductor of the distribution line showed discoloration in areas that were in proximity to the subject tree, as shown in Photograph 6. These areas of discoloration appeared predominantly black in color.
3. From a boom lift positioned at the phase conductor of the distribution line, the conductor was pushed by hand towards the subject tree. The conductor could be pushed approximately four (4) feet before the resistance due to tension increased beyond the estimation of likelihood.
4. A broken and burned portion of branch was found on the side of the subject tree facing the distribution line, as shown in Figure 8, measurement A. The distance between the base of this portion of branch<sup>20</sup> and the phase conductor of the distribution line was measured to be approximately 6 feet and 6 inches (78 inches) with a measuring tape.
5. A grouping of twigs was found to the south of the broken portion of branch on a limb that would later be collected as Item #9 (E-9). These limbs had patterns of discoloration that manifested in black dots that ran longitudinally along the twigs (See Photograph 8). The distance between these twigs and the phase conductor of the distribution line was measured to be approximately 4 feet and 7 inches (55 inches) with a measuring tape. None of these twigs had sprouted leaves by the time of the inspection.
6. The distribution lines were lowered from the poles, marked, cut, and tagged as evidentiary items.

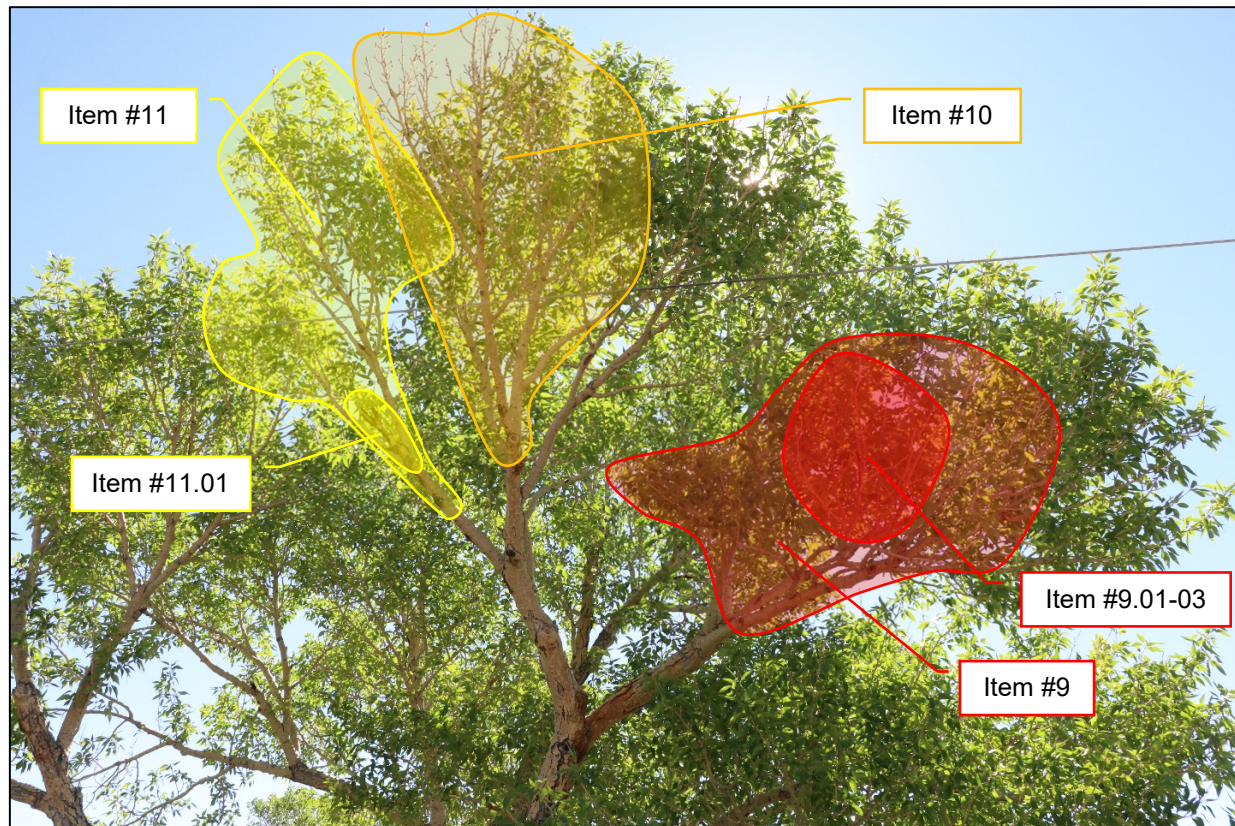
<sup>20</sup> This portion of branch would later be marked as Item 11.01



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7. Limbs of interest were harvested from the subject tree. These limbs were harvested generally from south to north since BEC personnel, who were performing the harvesting, had set the bucket truck to the south of the tree. Figure 9 shows the location of these branches prior to their harvesting.



**Figure 9 - Crown of subject tree with harvested branches highlighted.<sup>21</sup>**

<sup>21</sup> Sub-items #9.01 and #11.01 were not harvested during the June 16, 2022 inspection. They are highlighted for clarity to show their original positions within the crown of the subject tree.



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**Photograph 6 - Phase conductor with discoloration. Subject tree in background.**



**Photograph 7 - Evidence Item E-9. Photograph by Eric Black, IMG\_7954.**



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**Photograph 8 - Close up of evidence item E-9 which exhibits burned areas due to arc tracking. Photograph by Eric Black, IMG\_7956.**



**Photograph 9 - Evidence item E-10. Photograph by Eric Black, IMG\_7959.**



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**Photograph 10 - Evidence Item E-11. Eric Black IMG\_7961.**

**April 11, 2023 Joint-Party Evidence Inspection**

A joint-party laboratory inspection of the collected evidence was performed on April 11, 2023 in Denver, Colorado. The following items, and subsequent sub-items, were inspected:

**Table 2 - Items and sub-items inspected on April 11, 2023.**

Item Number	Description
1	Tree Branch with Burn on End
2	Ash Bucket Can
3	9' Section of Conductor w/ Possible Staining White Tape South Wnd-White & Red Tape on North End, sectioned.
3.01	Conductor section 60" to 100"
3.02	Conductor section 80.5" with Anomaly
4	9' Section of Conductor w/ Possible Staining White Tape South Wnd-White & Red Tape on North End.
4.01	Conductor section 36"- 60"
5	Section of Conductor w/ Possible Staining Blue Tape South End-Blue and Green Tape on North End.
6	Phase Conductor Coiled from Transformer to North End of E-4 South End Green Tape
7	from E-8 South to Intersection Pole
8	Phase Conductor and Insulator from Pole South of Subject Tree
9	Tree Branch SW side of Tree Canopy, Possible Resistance Heat Tracking on 2+ stems
10	Tree Branch Bundle, One Branch Missing Leaves, Budding Visible
11	Limb with Possible Char on it. Three stubs of Missing Branches

During the laboratory inspection, the following relevant observations were made:

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1. Discoloration was found on the distribution conductor sections that were originally located near the subject tree. This discoloration was not found on sections that were originally located farther north and south on the line.
2. Resinous material was found on the conductor section labeled Item #3.01. This material was amber in color and appeared to be solidified fluid deposit on the surface of the conductor section. See Photograph 11 and Photograph 12 below.



**Photograph 11 – Portion of line conductor Item 3.01 with soot deposits on the conductor.**

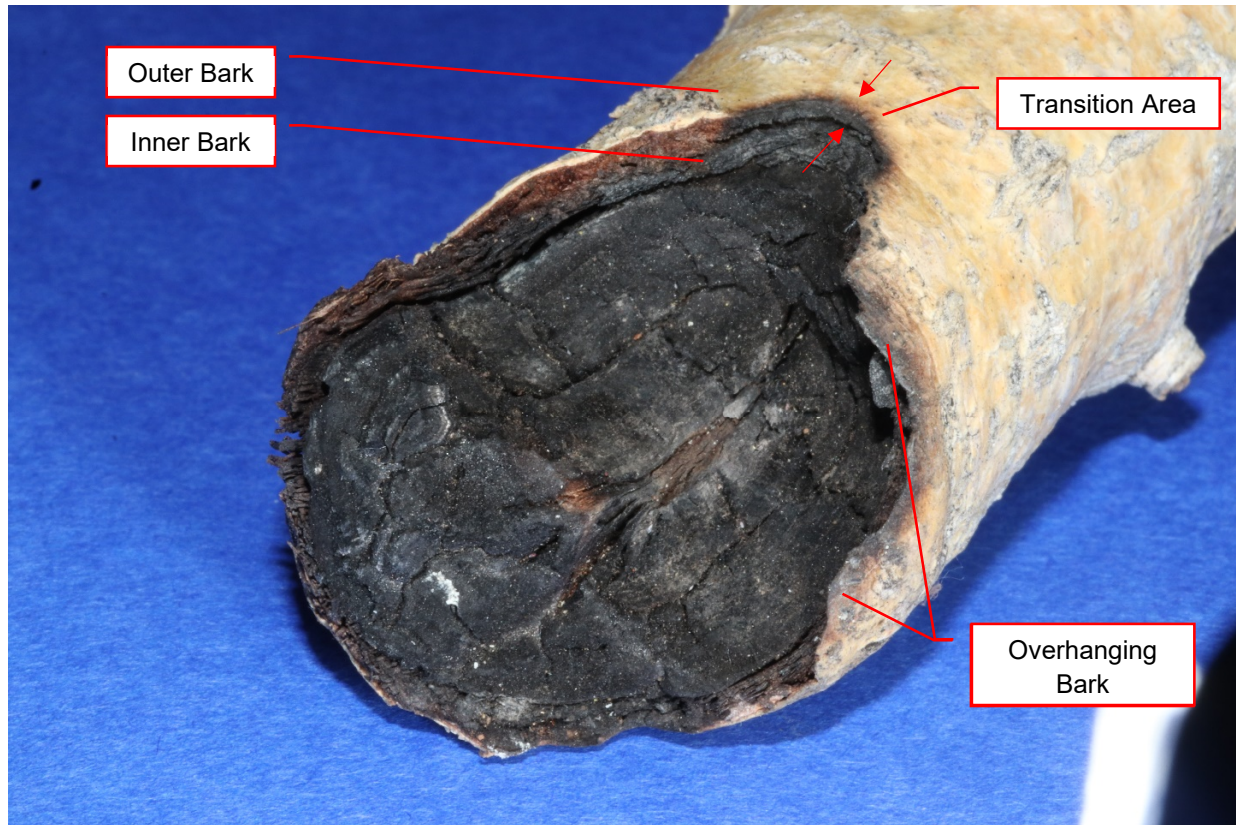


**Photograph 12 - Microscopy of Item 3.01 with resin deposit on the conductor. Resin material was noted in a number of locations on the conductor in the area where it was adjacent to the subject tree.**

3. The base end of Item #1 (E-1) showed signs of charring and burning through its entire diameter. The outer bark in the area showed a very narrow transition zone between portions that were unaffected by heat, areas that were discolored due to heat, and finally the area that had been fully consumed. There were areas along the circumference where the inner bark showed more damage than the outer bark. In some areas, the inner bark and wood had been completely consumed leaving an overhanging portion of outer bark. (See Figure 10.)



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**Figure 10 - Burnt end of Item #1 with callouts showing burn transition areas and overhanging outer bark.<sup>22</sup>**

4. Item #1 had a series of small holes that ran longitudinally along the base end of the branch as shown in Photograph 13. The perimeters of these holes were similar to the end of the branch in that the outer bark in the area had a sharp transition between unaffected material and material that was missing. Many of the holes had discolorations around portions of the perimeter in a seemingly directional pattern.

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<sup>22</sup> Photo taken from the July 27, 2023 inspection for clarity.

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**Photograph 13 - Basal end of Item #1 showing longitudinal holes in the bark.**

**June 12, 2023 Joint-Party Evidence Inspection**

A joint-party laboratory inspection of the collected evidence was performed on June 12, 2023 in Denver, Colorado. The following items, and subsequent sub-items, were inspected:

**Table 3 - Items and sub-items inspected on June 12, 2023.**

Item Number	Description
9	Tree Branch SW side of Tree Canopy, Possible Resistance Heat Tracking on 2+ stems
9.01	Tree branch with longitudinal damage
9.0101	Scrape Sample
9.0102	Scrape Sample
9.0103	Scrape Sample
9.0104	Bark Sample
9.0105	Bark Sample
9.02	Tree branch with longitudinal damage
9.03	Tree branch with longitudinal damage
9.04	Exemplar tree branch
9.0401	Woody sample
9.0402	Burned sample
9.0403	Burned sample
9.040301	Exemplar burned cross section
9.05	Fungal mass
9.06	Branch sample

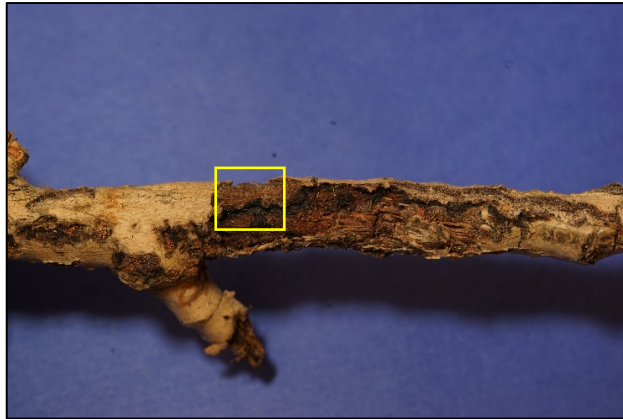
During the examination, the following relevant observations were made:



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1. Item #9 had a number of small limbs that had patterns of dark spots that ran longitudinally to the limb. These limbs were cut from the branch and marked as Items #9.01, 9.02, and 9.03. The markings were consistent in appearance with markings found on Item #1.
2. In addition to the small circular markings that were found running longitudinally, Item #9.01 showed a linear path of discoloration on its exterior. In addition to the discoloration, the pattern ran as a furrow in the exposed inner bark of the limb. The woody material within the furrow appeared to be pyrolyzed wood.



**Photograph 14 - Linear pattern on Item #9.01 with callout for Photograph 15**



**Photograph 15 - Microscopy of Item #9.01**

3. Samples of material within the discolored areas of Item #9.01 were taken for SEM imagery and marked as Items #9.0101, 9.0102, and 9.0103.
4. A portion of bark with circular black marks near the basal end of Item #9.01 was cut and peeled away from the interior portions of the limb. With the outer bark peeled away, the black marks on the interior layers of the limb were exposed. The markings appeared as discolored divots that extended deeper into the vascular layer of the limb. See Photograph 16 and Photograph 17.



**Photograph 16 - Item #9.01 with peeled outer bark.**



**Photograph 17 - Detail of markings on the interior layers of Item #9.01**

5. Portions of Item #9.01 were peeled with a knife so that the cut exposed a cross section of some of the black markings on the limb. Another section was cut in the same manner in an area without

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similar markings on limb #9.04 for the purpose of comparison. See Photograph 18 and Photograph 19.



**Photograph 18 - Item #9.01 with a cut exposing the profile of black markings.**



**Photograph 19 - Item #9.04 cut in the same manner as #9.01**



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6. Item #9.06 was cut from the main branches. The base of Item #9.06 had an area where the outer papery bark had split away exposing a darker portion of inner bark. This area was cut in the same manner as Item #9.01 to expose the layers between bark and inner tissue. The markings on Item #9.01 appeared to be darker than anything seen on the exposed portion of #9.06 (Photograph 20).



Photograph 20 - Item #9.01 (upper) next to Item #9.06 (lower)

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### **July 27, 2023 Joint-Party Evidence Inspection**

A joint-party laboratory inspection of the collected evidence was performed on July 27, 2023 in Denver, Colorado. The following items, and subsequent sub-items, were inspected:

**Table 4 - Items and sub-items inspected on June 27, 2023.**

Item Number	Description
1	Tree Branch with Burn on End
1.0101	Cut and Split Section
1.0102	Cut and Split Section
1.02	Cut Section from 1
1.03	Cut Section from 1
3.01	Conductor section 60" to 100"
3.02	Conductor section 80.5" with Anomaly
9	Tree Branch SW side of Tree Canopy, Possible Resistance Heat Tracking on 2+ stems
9.01	Tree branch with longitudinal damage
9.0101	Scrape Sample
9.0102	Scrape Sample
9.0103	Scrape Sample
9.0104	Bark Sample
9.0105	Bark Sample
9.010601	Cut Section from 9.01
9.010602	Cut Section from 9.01
9.02	Tree branch with longitudinal damage
9.0202	Cut Section from 9.02
9.020201	Cut Section from 9.0202
9.020202	Cut Section from 9.0202
9.020203	Cut Section from 9.0202
9.03	Tree branch with longitudinal damage
9.04	Exemplar tree branch
9.0401	Woody sample
9.0402	Burned sample
9.0403	Burned sample
9.040301	Exemplar burned cross section
9.05	Fungal mass
9.06	Branch sample
10	Tree Branch Bundle, One Branch Missing Leaves, Budding Visible
10.01	Terminal Leaf Sample
11	Limb with Possible Char on it. Three stubs of Missing Branches
11.01	Limb from Branch E-11
11.0101	Bark Sample from 11.01
11.0102	Bark Sample from 11.01

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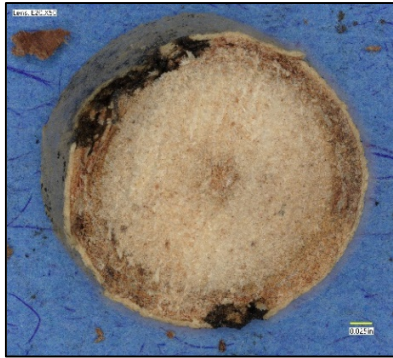


During the laboratory inspection, the following relevant observations were made:

1. Item #9.02 showed areas of discoloration that ran longitudinally to the limb. Two representative sections were chosen due to the uniformity of the of these areas across the two sections. One of the sections (#9.0202) was cut multiple times through selected blackened areas on its length, resulting in Items #9.020201-9.020203. Microscopy of the cut ends showed that most of the areas of discoloration showed penetration and mass loss all the way through the limb's vascular layer. See Photograph 21 through Photograph 26.



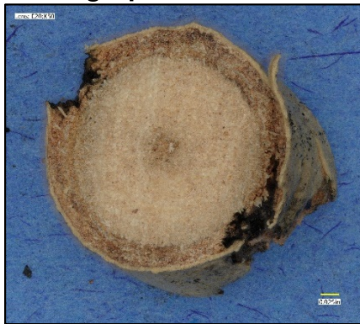
**Photograph 21 - #9.020201**



**Photograph 22 - #9.020202**



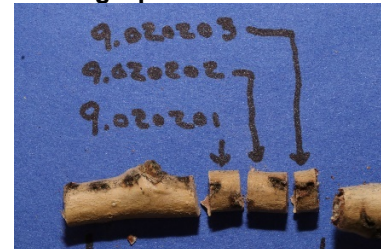
**Photograph 23 - #9.020203**



**Photograph 24 - #9.020201**



**Photograph 25 - #9.020202**



**Photograph 26 - Section locations from #9.0202**



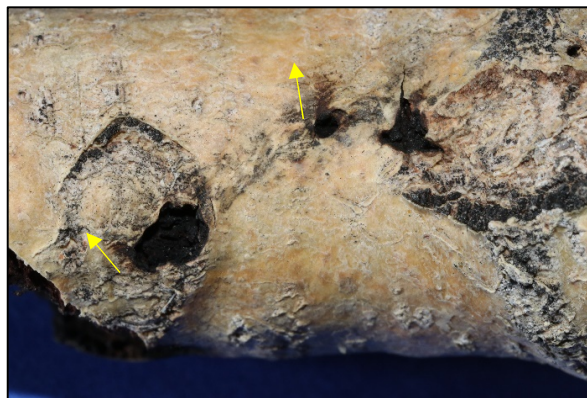
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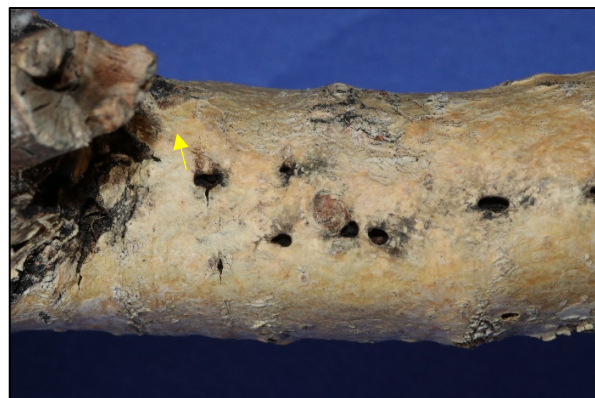
2. Areas near the basal end of Item #1 that showed roughly circular holes in the outer bark with blackened material beneath also showed areas of discoloration that extended radially from the holes in the outer bark. This radial discoloration appeared to extend in a consistent direction wherever it appeared along the branch. See Photograph 27 through Photograph 30.



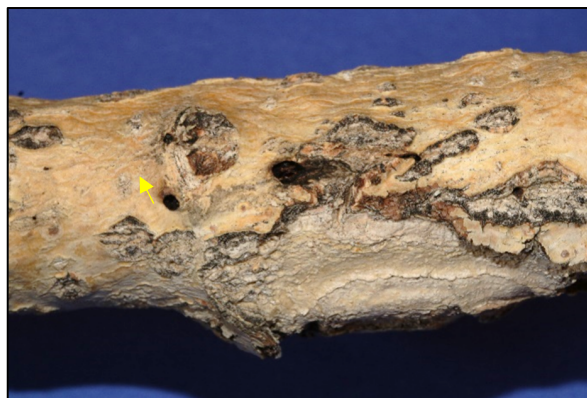
**Photograph 27 - Basal end of Item #1 with callouts for detail photos.**



**Photograph 28 - Detail of radial discoloration.**



**Photograph 29 - Detail of radial discoloration.**



**Photograph 30 - Detail of radial discoloration.**



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3. The burnt branch stump on Item #11 was cut from the rest of the branch and marked as Item #11.01. The portion of burnt branch showed significant signs of burning with multiple areas of charred wood along its length and circumference. Small circular holes, consistent with those found on Item #1, were found near the base of the limb in close proximity to an area of charring. See Photograph 31 and Photograph 32.



**Photograph 31 - Item #11.01**



**Photograph 32 - Detail of Item #11.01 showing circular holes near the base.**

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## 4.0 ANALYSIS

### Line Creek Vegetation Management

Beartooth Electric Cooperative owns approximately 1800 miles of lines in Montana and Wyoming.<sup>23</sup> In 2018, BEC decided to begin a cycle-based vegetation management (VM) plan. This plan called for all of their lines to be trimmed and cleared once every five years. Per BEC's customer agreement, which is referred to as a "Membership Application," BEC is granted rights of ingress for the purposes of maintaining the utility's right of way (ROW). For large VM projects, BEC generally hired a third-party contractor such as Davey or Asplundh. Eric Elton, the line supervisor for BEC, stated that they did not keep historical data regarding trimming operations performed by either BEC or their contractors.<sup>24</sup>

In 2021, BEC decided that the lines in Clark, Wyoming needed attention before the five-year cycle came to fruition. This "hotspot" work focused on the Canyon, Tolman, and Line Creek taps. BEC performed their own trimming along the Canyon and Tolman taps, but left the Line Creek tap to Asplundh, who they contracted with on May 26, 2021..<sup>25</sup>

Per BEC's Right-of-Way Clearing Contract, Asplundh was to perform their trimming work in multiple counties in Montana and in Park County in Wyoming. Clark, Wyoming and the Line Creek Tap are located in Park County. Vegetation was to be cleared to maintain a twenty (20) foot wide ROW corridor, with boundaries ten (10) feet to either side of the centerline between utility poles. This corridor was to be maintained from ground level to twelve (12) feet above conductor height.<sup>26</sup> BEC included Specification M1.30G, shown below in Figure 11, as a guide for this work. Specification M1.30G shows the ROW corridor being thirty (30) feet wide; however, it notes that the "30" in the drawing name can be changed to suit the desired width. If BEC had modified the drawing to reflect their desired twenty (20) foot width, the drawing name should have been changed to "M1.20G."

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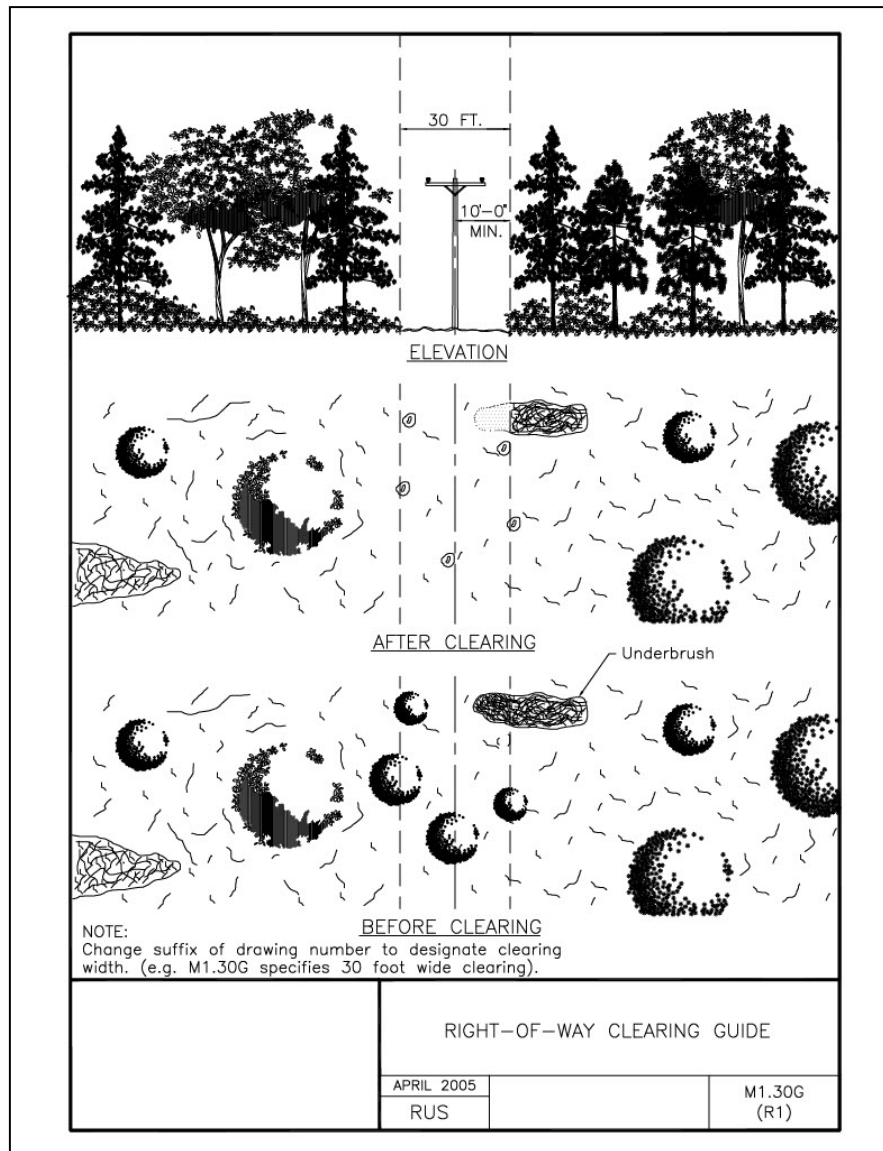
<sup>23</sup> May 16, 2023 deposition of Eric Elton 35:17

<sup>24</sup> May 16, 2023 deposition of Eric Elton 85:11

<sup>25</sup> Deposition exhibit 3.

<sup>26</sup> Beartooth Rule 26 00002

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**Figure 11 - Specification M1.30G<sup>27</sup>**

Asplundh began their work in Clark, Wyoming in August of 2021.<sup>28</sup> The scope of their work in Clark was limited to the Line Creek tap since BEC had already cleared the other taps in Clark. The work was performed primarily by Chuck Rowe and Perry Toler, who worked generally from east to west up Line Creek. When they came to assess the ROW that passed through the camp property, Rowe and Toler looked down the line from within their truck, which they had stopped beneath the line on Louis L'Amour Lane, as shown in Figure 12.

The distance between Rowe and Toler's viewing location and the subject tree was approximately three hundred (300) feet.<sup>29</sup> Rowe stated that their assessment of the tree took approximately ten (10) seconds,

<sup>27</sup> Taken from UEP Bulletin 1728F-804

<sup>28</sup> Deposition exhibit 54, ASPLUNDH 001508.

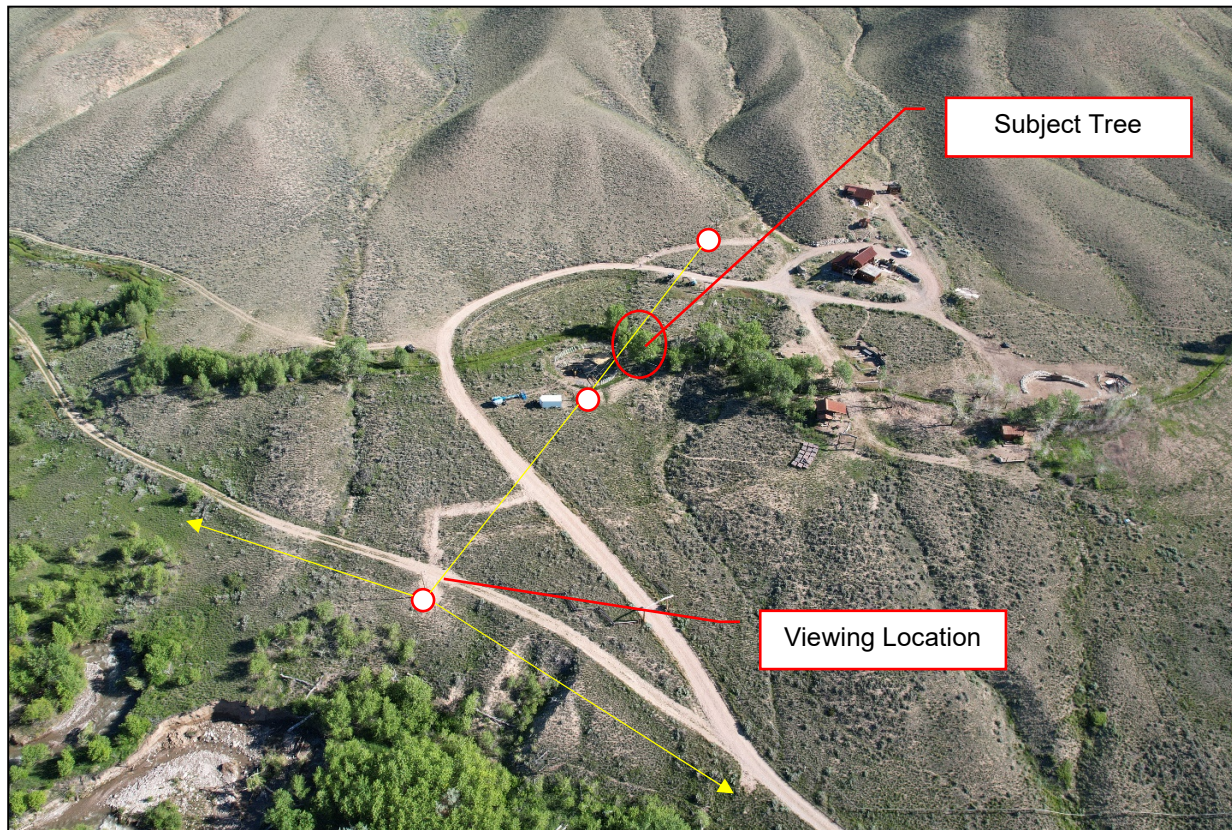
<sup>29</sup> Toler deposition pp. 27-28.



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after which time Rowe and Toler agreed that the subject tree was outside the ROW and did not need to be trimmed. In his deposition, Toler stated that the tree was twenty (20) to thirty (30) feet away from the distribution line. He also stated that he was not wearing the prescription glasses that were required for him to drive.



**Figure 12 - Aerial view of the location that the subject tree was assessed from.**

Eric Elton stated that he believed the last time that the subject tree would have been trimmed was likely in 2014 when BEC hired Davey to trim in Line Creek.<sup>30</sup> It is possible that the wounds found on the tree were from this work. The only other time that the ROW would have been assessed at 197 Louis L'Amour Lane would have been in 2020 during BEC's inspection of the utility poles on the property, at which time the "TESTED 2020" tags were nailed to the north and middle utility poles. Elton stated that during their inspection of the poles, it is their practice to inspect the lines concurrently.<sup>31</sup>

Elton stated that if they found trees entering the ROW during their line inspections, they would have trimmed the trees as soon as possible. No wounds were found on the tree that were consistent with work that might have taken place in 2020. Since it is unlikely that the subject tree's crown grew laterally 5 – 6 feet over the course of less than two years, it is apparent that BEC either did not perform a line inspection in 2020, or they vastly misjudged the bounds of their ROW on the property. It should be noted that Toler normally wore glasses but that on the day of his inspection he was not wearing his prescription glasses.<sup>32</sup>

<sup>30</sup> May 16, 2023 deposition of Eric Elton 256:02

<sup>31</sup> May 16, 2023 deposition of Eric Elton 184:22

<sup>32</sup> Toler deposition pp. 99-101.



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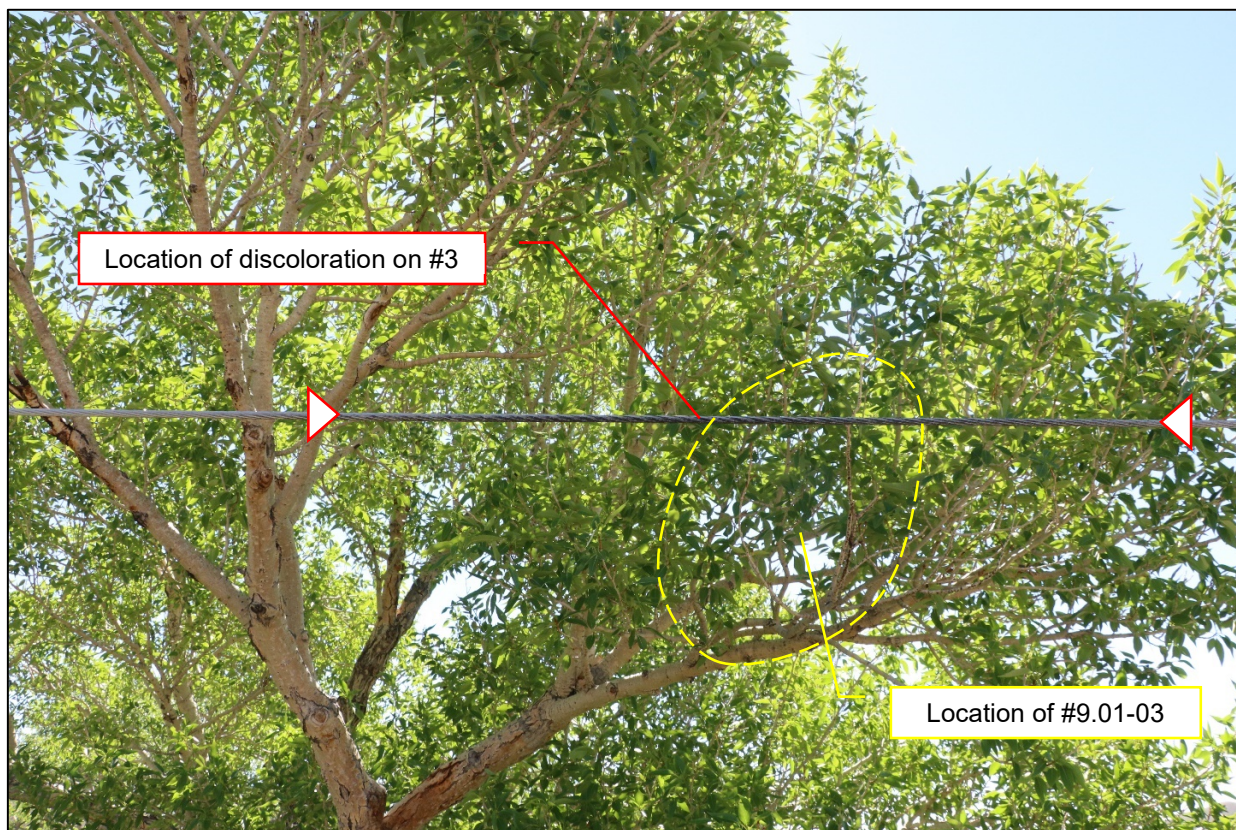


### **Subject Tree and Line Contact**

Evidence collected from the subject tree and the BEC distribution line shows that there was contact between the two that resulted in the generation of burning material. The discoloration on portions of the distribution line such as Item #3, and the characteristics of artifacts on Items #1, 9, and 11, are all consistent with vegetation contact with power lines.

### **Distribution Line Indicators**

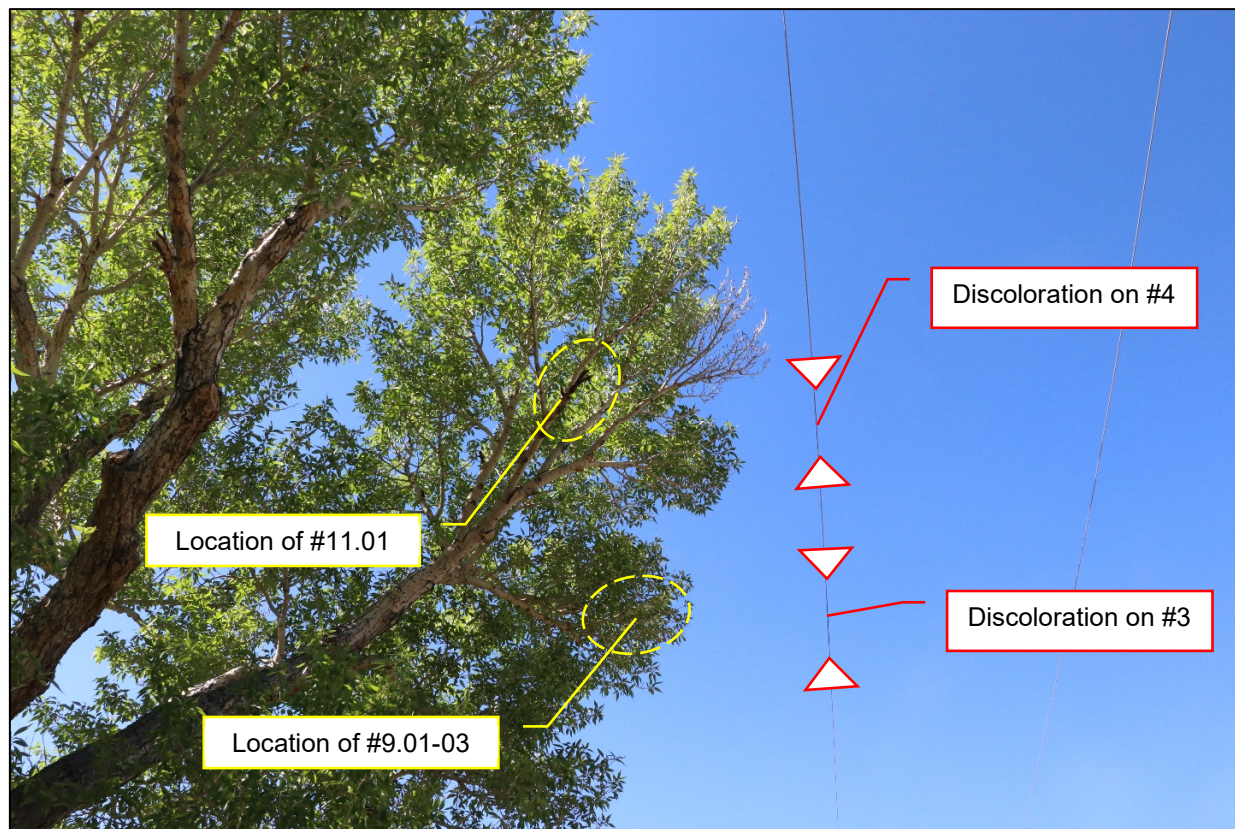
The discoloration on Item #3 is most likely the result of the deposition of soot and smoke, including the condensation of wood tars and other pyrolyzed aerosols. These depositions were found only on portions of the distribution line that were in relatively close proximity to the subject tree. Furthermore, these areas of discoloration coincided with burn indicators on the tree as shown in Figure 13 and Figure 14 below.



**Figure 13 – Area of discoloration on Item #3 in relation to Item #9.**



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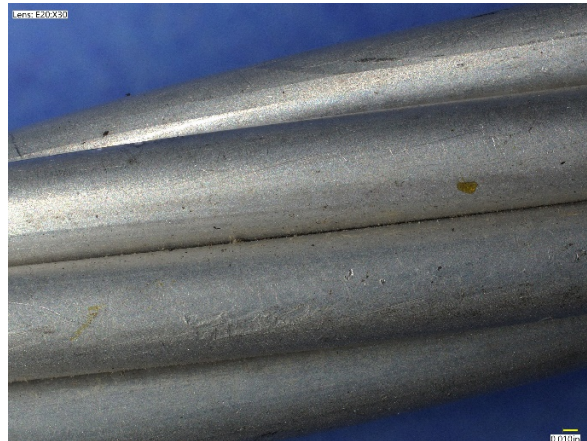
**Figure 14 - Locations of line discoloration in relation to burn indicators on the subject tree.**

Photograph 33 and Photograph 34 show the visual differences between sections of conductor that likely came into direct contact with portions of the crown of the subject tree. It is apparent that the discoloration is not a result of some macro-scale phenomenon that would affect the conductor as a whole. The only difference between a section that appeared similar to Photograph 33 and a section that appeared similar to Photograph 34 would be its proximity to nearby vegetation. Given that the nearby sections of vegetation show signs of burning, it is reasonable to conclude that the discoloration on the line is related to the burn indicators on the vegetation.

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**Photograph 33 - Detail of conductor segment #3.01 with discoloration.**



**Photograph 34 - Detail of conductor segment #3.01 without discoloration.**

#### Tree Crown Indicators

As stated, Items #1, 9, and 11 also showed signs of contact with the nearby distribution line in the form of burn indicators on their branches and limbs. These burn indicators were found in two general types of artifacts. The first type of artifact found was bulk portions of charred and pyrolyzed wood (Photograph 35), and the second type of artifact took the form of a series of small, generally circular, markings that ran longitudinally in a series along its limb or twig (Photograph 36).



**Photograph 35 - Area of #11.01 showing charring.**



**Photograph 36 - Area of #9.02 showing a longitudinal series of circular markings.**



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### *Charred Wood*

The bulk portions of charred wood are readily identifiable to anyone who has seen a campfire. These artifacts were found on the basal end of Item #1 (E-1), as shown in Photograph 37 and on multiple points along Item #11.01, as shown in Photograph 38.



**Photograph 37 - Charred area on Item #1.**



**Photograph 38 - One of multiple charred areas on Item #11.01.**

These portions of branch and limb suffered sustained combustion during the process of creating the characteristic lumpy scales of charcoal. This could only have been caused by ignition due to contact with the nearby electric distribution line.

In the case of Item #11.01, there are no other competent sources of ignition in or around its location within branch E-11. According to LiDAR scans of the area, the closest point of burning associated with the Clark Fire was approximately 140 feet downwind to the east.<sup>33</sup> As there were no reports of lightning in the area at the time of the fire, the only nearby competent source of ignition was the BEC distribution line. As stated above, the portion of line in proximity to Item #11.01 showed discoloration from the contact that occurred.

Although Item #1 was found on the ground downwind of the subject tree, the burning that occurred at its base could only have been caused by contact with the distribution line. The branch was found in an area that had no other burning, as shown in Figure 15 and Figure 16. The branch obviously traveled to its location on the ground after it began to burn. Since there were no other signs of burning between E-1 and the crown of the subject tree, it can be determined that E-1 originated at the subject tree. As with Item #11.01, there are no other competent ignition sources available to initiate burning in the crown of the tree other than the nearby distribution line.

<sup>33</sup> GPRS 0003



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**Figure 15 - Excerpt from Ex 14-16-a. The red box shows the general location that Pam Nelson found branch E-1.**



**Figure 16 - Excerpt from Ex 14-17-a showing unburnt material around E-1.**

Burning that caused the charring in Items #1 and #11.01 was initiated by the flow of electrical current that resulted from the contact between the crown of the tree and the distribution line. The current path for this electrical contact would have been from one or more portions of the tree's crown to the electrical ground reference for the distribution line. Practically speaking, this electrical ground can be considered to be the physical ground at the base of the tree.

The current flow from the distribution line and through the tree was not sufficient to trip the upstream circuit protection, which would have been the OCR located approximately 1.5 miles upstream on the circuit. BEC did not know the settings for the OCR, but they did know that the OCR's trip counter did not show an outage on the line.

Since the voltage on the distribution line would have been fixed at 7.2 kilovolts, the current passing through the subject tree would have been inversely proportional to the electrical resistance between the line and ground. This is shown in Equation 1, where  $V$  is the voltage of the line,  $R$  is the electrical resistance, and  $I$  is the resulting current flow.

**Equation 1 - Ohm's Law, solving for current.**

$$I = \frac{V}{R}$$

In the case of the subject tree's contact with the distribution line,  $R$  would be the combination of the resistance between the distribution line and the tree, and the internal resistance of the tree itself. Factors such as the height of a tree at the point of contact, and the tree's moisture content affect the tree's internal resistance. Since the subject tree was entering its dormancy phase for the upcoming winter, and since the area had been suffering from a drought, it is safe to assume that the tree's internal resistance was higher than it normally would have been.<sup>34</sup>

The component of resistance between the tree and the distribution line is the more significant factor in the cause of the fire. The point of contact between the tree and the line can be considered a "high-resistance" connection. These types of connections are often referred to as "hot-spot" connections because they are commonly an area of extreme heat production. This heat can be sufficient to initiate combustion itself, but it

<sup>34</sup> Gora, Yanoviak. 22 October 2014. Electrical properties of temperate forest trees: a review and quantitative comparison with vines. NRC Research Press. [www.nrcresearchpress.com/cjfr](http://www.nrcresearchpress.com/cjfr)

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can also lead to small arcing events that consequently ignite the pyrolyzed vapors of the contacted woody material. One of these scenarios would have been the ultimate source of ignition for the charred areas on Item #1 and #11.01.

#### *Circular Markings*

The second type of indication that the crown of the subject tree came into contact with the distribution line was a series of small, generally circular, markings that ran longitudinally along its respective limb or branch. This type of indication was seen on Items #1, #9.01, #9.02, #9.03, and #11.01, as seen in Photograph 39 through Photograph 43.



**Photograph 39 - Markings on Item #9.01**



**Photograph 40 - Markings on Item #9.02**



**Photograph 41 - Markings on Item #9.03**



**Photograph 42 - Markings on Item #1**



**Photograph 43 - Markings on Item #11.01**

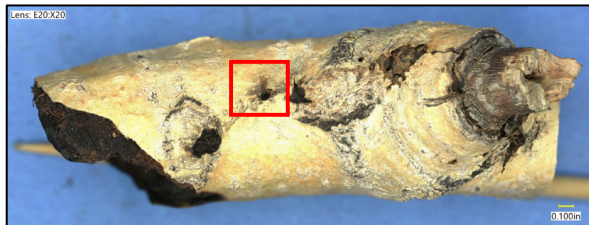


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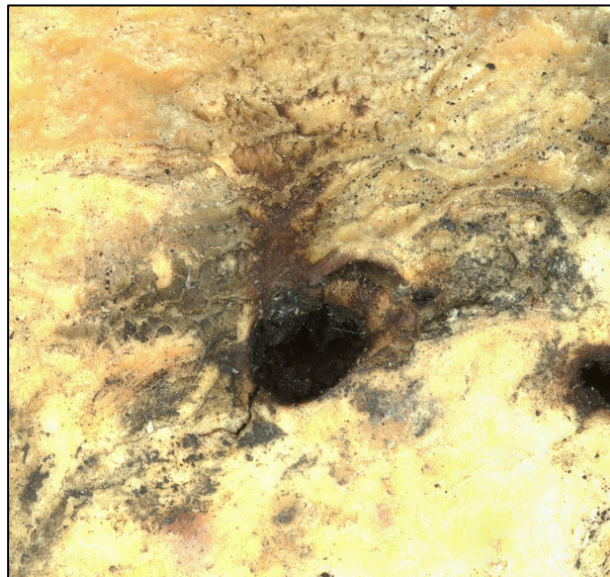


While these markings varied in exact size, shape, and spacing, all of these markings resulted in holes in the outer bark of the limb or branch. Each of the holes showed blackened areas underneath with mass loss in the vascular tissue of the limb or branch, as seen in above in the section of this report discussing observations from the July 27, 2023, evidence inspection.

As noted in the observations from the July 27, 2023, evidence inspection, some of the holes found in Item #1 appeared to have pattern of discoloration that extended radially from the perimeter of the hole in the outer bark. Of the four radial patterns that were found on Item #1, each area of discoloration extended from its respective hole in a direction within approximately 45 degrees of the others. This directionality appears to be consistent with the escape of gasses into a uniform wind field. The discoloration may be the deposition of condensed vapors, or it may be the result of hot gasses discoloring the outer bark itself.



**Figure 17 - Composite microscopy of the basal section of Item #1 with a box showing the location of Figure 18**



**Figure 18 - Hole in the outer bark of Item #1 showing a radial pattern of discoloration.**

The series of longitudinal circular markings were found on branches E-9 and E-11 within the crown of the tree. Except for some inconclusively similar spots on E-10, no other branch was found on the subject tree with these markings. The areas on E-9 and E-11 where these markings were found were all measured to be within the 10-foot ROW of the distribution line.

Furthermore, these markings were predominantly found on areas of potential contact if the limb or branch and the distribution line were brought together. This is shown in Figure 19, where the majority of the markings are in a location on their limb that would make contact if the parent branch were to move forward and down onto the nearby distribution line. The markings on Item #11.01 are also on the side of the branch that generally faces the distribution line.

A variation in this general pattern can be found on Item #9.02, which has a second series of markings that are located on the opposite site of the limb. This second pattern is located on an area that would make contact if the branch were to first pass the line downwards and then rebound.

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**Figure 19 - Photo of Items #9.01, #9.02, and #9.03 from the perspective of the distribution line.**

Given that these series of longitudinal circular markings were only found on portions of the crown in close proximity to the distribution line, that the markings were positioned on portions of the limb that might strike or rebound against the distribution line, and that some of the holes showed signs of escaping hot gasses, it is more likely than not that these markings are indicators of contact between the crown of the subject tree and the BEC distribution line.

### **Windstorm**

The night of November 15, 2021, starting around 8:00 p.m., the Line Creek area experienced a windstorm that affected large portions of Wyoming and Montana. Wind speeds in the vicinity of 197 Louis L'Amour Lane were estimated to be between fifty (50) and sixty (60) miles per hour, with gusts around 85 mph.<sup>35</sup>

The subject distribution line runs generally perpendicular to the usual wind directions that pass through the area. This was also the case the night of November 15, 2021. While the general wind direction would have pushed the subject line towards the subject tree, gusting wind across the line likely resulted in both aeolian and galloping line movement between the utility poles. Likewise, the subject tree was likely pushed and rebounded in all directions during the windstorm. Given that portions of the tree's crown were measured to be 3.5 feet away from the phase conductor, contact between the tree and the line is entirely expected. Especially considering that the June 16, 2022 inspection of the line and the tree found

<sup>35</sup> WERTH 0001 – WERTH0024, NWS Forecast 5.5.2



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that the distribution line could easily be moved by four (4) feet. BEC admits that the tree likely made contact with the distribution line on November 15, 2021.<sup>36</sup>

As shown by evidence collected from and around the subject tree, the contact that occurred during the windstorm resulted in burning twigs and limbs falling from the tree and traveling eastward with the wind. Contact between the tree and the distribution line would have resulted in a high resistance connection between the tree and the line. The resulting current flowing through the tree would be low enough that the fault would not trip the upstream circuit protection. BEC stated that they did not record any power interruptions prior to the fire. The currents that generally flow as a result of vegetation contact are usually low enough that arcing and melting on the line are not readily visible or easily detected. This was the case with the subject distribution line, where the only apparent markings left by the contact was a sooty discoloration on the line in the area adjacent to the subject tree.

While the electrical damage to the distribution line was negligible, the damage to the limbs of the tree were significant. Large portions of charred wood were found on Item #11.01, and the base of Item #1 was completely charred through. The burning seen on these parts of the tree would have resulted in a preponderance of glowing and flaming embers. As the wood in these areas is burned, embers will fall and be cast away from the tree. This would have been compounded by the mechanical effects of the tree's contact with the line. Once the embers were cast from the tree, they would have been carried by the wind along distance defined by local windspeeds as well as the size and shape of the firebrand itself.

Eyewitnesses to the fire consistently described the winds carrying burning embers distances of multiple hundreds of feet. After she had been awakened by the fire, Ms. Nelson began working to evacuate the property. During this process, she took a short video of the fire. Winds through the valley had become severe, and the video shows embers from the fire being carried hundreds of feet from west to east.<sup>37</sup> Larry Dodge, a firefighter assigned to perform structure protection at 177 Louis L'Amour Lane, described the winds carrying embers two to three hundred yards (600 – 900 feet).<sup>38</sup>

The winds on the night of November 15, 2021 would have been more than sufficient to carry burning embers from the subject tree to the fire's specific origin area approximately 150 feet away.<sup>39</sup> This area, which was near the northwest corner of the 12-by-12 outbuilding would have had sufficient ground fuels for a firebrand to ignite.<sup>40</sup> Pam Nelson stated that the area was strewn with autumn leaves, and photos show that the area generally has wild grasses growing there. These lightweight fuels would have also been very dry due to the recent drought conditions in the area. As seen by the resulting fire, ignition from a firebrand would have been easily achieved.

### **Utility Actions**

On November 15, 2021, BEC responded to outages and requests for assistance. Their reactive response did not follow any proactive measures that might have prevented the ignition of the fire. It is common for utilities in vulnerable areas to adopt a policy that can enact a Public Safety Power Shutdown (PSPS). In cases where high winds and dry conditions create extreme fire hazards, a utility can perform a PSPS to temporarily shut down vulnerable areas of their grid. After a PSPS has been enacted, vegetation contact

<sup>36</sup> BEC Admissions, K. Owens Depo pp. 117-118, 224, RFA #6, IROG #5

<sup>37</sup> Exhibit 15, P. Nelson depo pp. 85

<sup>38</sup> March 16, 2023 deposition of Larry Dodge 12:24

<sup>39</sup> Wildland Fire Spot Ignition by Sparks and Firebrands, A.C. Fernandez-Pello, 12<sup>th</sup> IAFSS, Lund, Sweden, June 2017. PMS 412 pp. 30. NFPA 921-2021 pp. 340, 27.5.5.1

<sup>40</sup> Specific origin area as determined by Alan Carlson

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with utility equipment or equipment breakage will not result in a fire. After the weather conditions stabilize, the utility can inspect their equipment and restore power to their circuits.

While PSPS plans are most widely adopted in western states such as California, Nevada, and Oregon, there are utilities in the Rocky Mountain regions that also have adopted the practice. Rocky Mountain Power, who supplies power to nearby Cody, Wyoming has a PSPS program in place for the exact conditions that occurred the night of November 15, 2021.<sup>41</sup> PSPS programs have not been adopted as a standard but have become a “best practice” being followed by many utilities.

If BEC had a PSPS program in place, they would have been able to deenergize their Line Creek Tap prior to the windstorm. BEC would have been notified of the likelihood of hazardous winds as early as 2:48 a.m. on November 14 when the National Weather Service (NWS) issued a High Wind Watch. The NWS re-issued the notification at 2:28 p.m. on November 14, 2021. By 3:58 a.m. on the 15, the NWS had upgraded the notice to a High Wind Warning citing the likelihood of winds gusting above 70 mph. These notices would have given BEC plenty of time to deenergize the Line Creek Tap, and the contact between the subject tree and the distribution line would not have resulted in a fire.

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<sup>41</sup> <https://www.rockymountainpower.net/outages-safety/wildfire-safety/public-safety-power-shutoff.html>



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## 5.0 OPINIONS

Opinions stated in this report are based on a reasonable degree of engineering and scientific probability and are based on the materials presented above. We reserve the right to amend this report or provide a supplemental report as new information becomes available.

### 5.1 The fire originated on the Hutton property located at 197 Louis L'Amour Lane, Clark, Wyoming.

**5.1.1 Basis:** See the Origin & Cause report issued by Alan Carlson.

**5.1.2 Basis:** See the November 16, 2021 fire cause investigation report issued by Chief Nathan Hoffert of the Park County Fire District #4.

### 5.2 The fire was caused by falling embers that resulted from vegetation contact with an electrical distribution line owned by Beartooth Electric Cooperative, Inc.

**5.2.1 Basis:** Evidence of vegetation contact with the BEC distribution line was found on the subject tree as well as on fallen limbs that were found on the ground nearby.

**5.2.2 Basis:** Statements made by BEC employees, including Eric Elton and Kevin Owens, admit that portions of the subject tree likely came into contact with their distribution line at 197 Louis L'Amour Lane.<sup>42</sup>

**5.2.3 Basis:** Statements made by BEC's third-party forensics expert admits that portions of the subject tree appeared to have made contact with BEC's electrical distribution line.<sup>43</sup>

**5.2.4 Basis:** Embercast from vegetation contact with utility lines is a competent ignition source for the dry fuels such as grass and duff on the ground within the fire's general origin area.

**5.2.5 Basis:** Winds at the time of the fire were sufficient to carry embers from the point of vegetation contact to the fire's area of origin. Multiple witnesses stated that they saw embers from the fire traveling distances in excess of one hundred (100) feet.

**5.2.6 Basis:** No other competent sources of ignition were found within or around the fire's specific origin area.<sup>44</sup>

### 5.3 Vegetation contact with the electrical distribution line occurred due to a failure in BEC's vegetation management practices.

<sup>42</sup> May 16, 2023 deposition of Eric Elton 46:05

<sup>43</sup> December 17, 2021 report by Eric Black (Beartooth Rule 26 000057)

<sup>44</sup> O&C report by Alan Carlson

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**5.3.1 Basis:** Per BEC's Right-of-Way Clearing Contract,<sup>45</sup> BEC's vegetation management policy requires that the subject distribution line be clear of vegetation within ten (10) feet of the centerline between utility poles.

**5.3.2 Basis:** LiDAR scans taken around the distribution line after the fire showed that portions of the crown of the subject tree were within four (4) feet of the BEC distribution<sup>46</sup> line and five (5) feet of the centerline between the distribution line's two poles.<sup>47</sup>

**5.3.3 Basis:** The portion of limb that was marked "E-1" (Item #1) showed signs of contact with the BEC electrical distribution line. Charred wood found at the base of the limb is consistent with burning that would have resulted in glowing or flaming embers.

**5.3.4 Basis:** Charred wood was found on the portion of the subject tree that was marked Item #11.01. This charring was likely the result of contact with the subject distribution line and would have produced glowing or flaming embers.

**5.4 It was the responsibility of BEC to maintain vegetation clearances on the subject electrical distribution line.**

**5.4.1 Basis:** Per BEC's customer Application for Membership,<sup>48</sup> BEC reserves the right to clear the right-of-way on the customer's property using either physical or chemical means.

**5.4.2 Basis:** Per BEC's Right-of-Way Clearing Contract<sup>49</sup> with Asplundh, BEC hired Asplundh to trim the vegetation along the subject electrical distribution line while retaining the right to inspect any work performed by Asplundh. Per the deposition of Eric Elton this inspection never occurred on the subject electrical distribution line<sup>50</sup> and BEC did not keep any historical records of vegetation management operations on their lines.<sup>51</sup>

**5.5 Asplundh failed to clear vegetation from the subject line during their 2021 work on the Line Creek Tap per BEC's Right-of-Way Clearing Contract with Asplundh.**

**5.5.1 Basis:** Per section 5.D of BEC's Right-of-Way Clearing Contract<sup>52</sup> with Asplundh, distribution lines, such as the line that supplied power to 197 Louis L'Amour Lane,

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<sup>45</sup> Beartooth Rule 26 00001-00007

<sup>46</sup> GPRS 0015

<sup>47</sup> GPRS 0011

<sup>48</sup> Beartooth Rule 26 00011, 00012

<sup>49</sup> Beartooth Rule 26 00001-00007

<sup>50</sup> May 16, 2023 deposition of Eric Elton 53:24

<sup>51</sup> May 16, 2023 deposition of Eric Elton 85:11

<sup>52</sup> Beartooth Rule 26 00001-00007



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should be cleared of vegetation to a distance of ten (10) feet from ground level to twelve (12) feet above conductor height.<sup>53</sup>

**5.5.1 Basis:** LiDAR scans taken around the distribution line after the fire showed that portions of the crown of the subject tree were within four (4) feet of the BEC distribution<sup>54</sup> line and five (5) feet of the centerline between the distribution line's two poles.<sup>55</sup>

**5.5.2 Basis:** Asplundh personnel chose not to trim the subject tree based off viewing the tree at a distance rather than performing any actual measurements. The assessment of the subject tree's proximity to the BEC distribution line was performed at a distance of approximately three hundred (300) feet. The visual assessment took approximately ten (10) seconds.<sup>56</sup> Of the two Asplundh personnel performing the assessment, one stated that they were not wearing the prescription glasses that were required of them to drive and was likely visually impaired at that time.<sup>57</sup>

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<sup>53</sup> Beartooth Rule 26 00009

<sup>54</sup> GPRS 0015

<sup>55</sup> GPRS 0011

<sup>56</sup> May 17, 2023 deposition of Charles Rowe 56:08

<sup>57</sup> May 17, 2023 deposition of Perry Toler 99:25

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## 6.0 QUALIFICATIONS OF THE AUTHOR



**Education**

BS, Electrical Engineering,  
University of Idaho, 1987

BS, Forest Resource Management,  
University of Idaho 1983

**Registrations**

PE: AK, CA, HI, ID, MT, NV, OR,  
TX, WA

**Certifications**

Certified Fire Investigator, IAAI,  
2011, No. 21-042014

Certified Fire and Explosion  
Investigator, NAFI, 1998,  
No. 6146-1947

**Associations**

Member, International Association  
of Arson Investigators (IAAI)

Member, Institute of Electrical and  
Electronic Engineers (IEEE)

Member, National Association of  
Fire Investigators (NAFI)

Member, National Fire Protection  
Association (NFPA)

Member, Puget Sound Marine  
Claims Association (PSMCA)

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**PAUL T. WAY** PE, CFI, CFEI, PI  
 TECHNICAL FELLOW, ELECTRICAL ENGINEER

### Bio

Paul has performed thousands of investigations since 1995, specializing in large complex loss investigations. He has particular expertise in the following areas: electric shock/electrocution; low, medium, and high voltage electrical equipment and systems; transformers; rotating machines; substations and electrical power generation facilities; electrical distribution and transmission; electrical grounding system design; chemical and manufacturing plants, timber and paper mills; construction and commissioning, consumer product failure and fires, marine fires, wildland fire, and vegetation management.

Paul is proficient in mechanical design, repair, and troubleshooting of refinery process equipment, including piping system design and analysis, heat exchanger design and repair, pump design and flow analysis, and valve design and repair. He is trained in material selection for strength and corrosion resistance, mechanical design, failure analysis, and pressure drop studies. Before pursuing an engineering career, Paul worked as an appliance and furnace repair technician and is experienced with proper operation and repair of large appliances, including clothes washers and dryers, dishwashers, and furnaces.

With degrees in both electrical engineering and forest resource management he is a known expert in wildland fire investigation, vegetation management, right-of-way management, and electrical distribution and transmission issues.

Paul is involved in many of the wildland fires in the United States and has expertise in wildland fire mitigation plans, auditing, pre-inspection plans and tree/vegetation treatment activities. Finally, he has extensive knowledge of design, maintenance, and repair activities that can impact grid reliability and fire ignition risk.

Paul provides expert litigation support and testimony to law firms, insurance companies, and manufacturers. He is known for his ability to communicate complex engineering concepts accurately and concisely, yet easy to understand manner that enables his clients to make good decisions.

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*Paul T. Way PE, CFI, CFEI, PI*

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### *Professional Highlights*

TECHNICAL FELLOW, ELECTRICAL ENGINEER, JENSEN HUGHES, INC., MOUNTLAKE TERRACE, WA, 1997-PRESENT

*Technical Fellow, Electrical Engineer, 2020-Present*  
*Director, Technical Lead Electrical, (formerly CASE Forensics), 2016-2020*  
*Principal, Electrical Engineer, CASE Forensics, 1997-2016*

Forensic Engineer specializing in electrical fire cause and origin, electrical system failures, electrical and electronic product analysis, and testing, ground system and soil resistivity testing, and engineering consulting on electrical system design and analysis. Heavy equipment accident reconstruction. Appliance fire and failure investigations. A complete list of forensic projects is available on request.

Notable investigations include the fire at the Brennan's of Houston restaurant, the Bastrop Complex wildland fire, the Seattle Yacht Club fire, the Polar Bear vessel fire, the fire and explosion at the Anchorage Municipal Light and Power Plant #1, the explosion and fires at the Babine and Lakeland timber mills in British Columbia, the wildland fires known as Wolsey and Butte, and the explosion of a large transformer in Kissimmee, Florida.

PACIFIC TESTING LABORATORIES, SEATTLE, WA, 1996-1997

*Consulting and Forensic Engineering Department Manager, 1997*  
*Senior Project Engineer, 1996-1997*

Provided engineering and design consulting to heavy industrial, commercial, construction, and manufacturing clients. Performed electrical system analysis, ground system design and testing, including soil resistivity testing, and plant control design. Evaluated electrical system safety, design, and equipment selection. Performed power quality studies and investigation of power-related equipment failures. Performed due diligence studies for property acquisition.

LEAD ELECTRICAL ENGINEER, ZURN/NEPCO, REDMOND, WA, 1992-1996

Lead Electrical Engineer providing engineering and design, technical analysis, and resolution of electrical engineering problems. Prepared construction drawings, construction specifications, and design calculations. Reviewed, analyzed, and resolved field construction problems and discrepancies and interfaced with client, utility, and contractors as required. Prepared equipment procurement specifications and requisitions including bid analysis. Evaluated grounding requirements and prepared coordination studies. Provided field startup assistance and troubleshooting. Prepared standard specifications for engineered equipment. Coordinated all electrical aspects of power plant engineering, design, and construction.

SENIOR ELECTRICAL ENGINEER, ANVIL CORPORATION, BELLINGHAM, WA, 1990-1992

Electrical Engineer responsible for engineering and design, equipment procurement, project management activities in petrochemical and other industrial plants. Performed engineering analysis of electrical systems and recommended protective devices and schemes. Selected equipment for hazardous area installations and performed hazardous area analysis.

ELECTRICAL ENGINEER, R.W. BECK AND ASSOCIATES, SEATTLE, WA, 1989-1990

Electrical Engineer responsible for engineering and design, equipment procurement, and project management activities for municipal and government projects. Coordinated all engineering disciplines including mechanical, electrical, and structural.

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*Paul T. Way PE, CFI, CFEI, PI*

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### *Professional Highlights, Continued*

DESIGN ENGINEERING DEPARTMENT, PLANT ENGINEER, CHEVRON USA, EL SEGUNDO, CA, 1987-1989

Plant Engineer, responsible for plant and shutdown engineering and budgeting activities. Performed piping system analysis, heat exchanger mechanical design, pump design, failure analysis, and pressure drop studies. Received training in all engineering disciplines, became familiar with materials selected for strength and corrosion resistance. Reviewed equipment and material failures and damage and recommended upgrades to prevent future problems.

ENGINEERING ASSISTANT, US. ARMY CORPS OF ENGINEERS, LOWER GRANITE/LITTLE GOOSE PROJECT, POMEROY, WA, 1985-1987

Responsible for general plant electrical and mechanical engineering activities.

REPAIR TECHNICIAN, WAY'S APPLIANCE SERVICE, FREMONT, NE, 1974-1978

Large appliance repair technician employed in family business. Specialized in repair and installation of clothes washers and dryers, dishwashers and furnaces. Performed service calls, shop repairs, electrical troubleshooting, and installations.

### *Notable Publications + Presentations*

Way, P.T., "Vegetation Management and Power Lines," Wildland Fire Litigation Conference, Coronado, CA, 2016  
 Way, P.T., "Wildfire Ignition Sources," Wildland Fire Litigation Conference, Monterey, CA, 2016

Way, P.T., "Large Loss Investigations," Hands Across the Border, IAAI, Langley, BC, 2016

Way, P.T., "What the Heck is a SCADA System and What Does It Tell the Investigator? Wildland Fire Litigation Conference, Monterey, CA, 2014

Way, P.T., "Power Generation, Transmission and Distribution," Wildland Fire Litigation Conference, Monterey, CA, 2011

Way, P.T., Henriksen, T.L., "An Assessment of the Ability of Light Bulbs to Ignite Various Types of Cardboard, Fire and Materials," 12th International Conference, January 2011

Way, P.T., "Arcs, Sparks and Winter Fires," CASE Studies Continuing Education CE/CLE Seminar for Adjusters and Attorneys, Mountlake Terrace, WA, 2010

Way, P.T., "Accidental Fire Cause," SAFECO Insurance Company, SIU Meeting, 2007

Way, P.T., "How to Prepare for a Cold Weather Fire Investigation," Arson Reporter, Washington State IAAI, Chapter 21, Fall Issue, 2007

Way, P.T., "Fires Caused by Electronics," National Association of Subrogation Professionals (NASP), National Association of Subrogation Professionals Annual Conference, New Orleans, LA, 2007

Way, P.T., "Power Generation, Transmission, and Distribution Equipment," FM Global Adjusters and Risk Management Internal Training Seminar, Bellevue, WA, 2007



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### *Notable Publications + Presentations, Continued*

Way, P.T., "Product Failure and Product Liability Forensic Investigations, An Engineer's Perspective," University of Washington Extension, Private Investigation Program, coordinated by the King County Public Defender Office, Seattle, WA, 2003

Way, P.T., "Premises Liability and Safety Hazards," Washington State Trial Lawyers Association (WSTLA) Conference, Seattle, WA, 1999

Way, P.T., "Electrical Fire Investigation," Two-day seminar presented to Aberdeen Fire Department Personnel, Aberdeen, WA, 1999

Way, P.T., "Electrical Fire Investigation," Two-day seminar presented to Douglas County Fire District 2 Personnel, East Wenatchee, WA, 1999

### *Professional Standings*

#### LICENSES

- + Registered Professional Engineer, Alaska, No. 10729
- + Registered Professional Engineer, California, No. 20929
- + Registered Professional Engineer, Hawaii, No. 16251
- + Registered Professional Engineer, Idaho, No. 13289
- + Registered Professional Engineer, Montana, No. 19993
- + Registered Professional Engineer, Nevada, No. 020628
- + Registered Professional Engineer, Oregon, No. 69242PE
- + Registered Professional Engineer, Texas, No. 123690
- + Registered Professional Engineer, Washington, No. 35289
- + Licensed Unarmed Private Investigator, Montana, No. 10410
- + Licensed Unarmed Private Investigator, Washington, No. 1369

#### CONTINUING EDUCATION + TRAINING

- + 12th Annual Wildland Fire Litigation Conference, Coronado, 2018
- + 11th Annual Wildland Fire Litigation Conference, Coronado, 2017
- + 2017 EC&M NEC Code Change Conference, Seattle, December 2016
- + 10th Annual Wildland Fire Litigation Conference, Monterey, 2016
- + Evidence Examination: What Happens at the Lab?, CFI Trainer.Net, October 2016
- + Preparation for the Marine Fire Scene, CFI Trainer.Net, October 2016
- + Basic Electricity, CFI Trainer.Net, October 2016
- + Electrical Safety, CFI Trainer.Net, October 2016
- + Explosion Dynamics, CFI Trainer.Net, April 2016
- + Construction Safety & Health 10-Hour, OSHA, October 2015
- + 15th Annual Fire and Materials Conference, San Francisco, February 2015
- + Seattle Insurance Seminar, Insurance Society of Idaho, September 2014
- + Seattle Insurance Seminar, Insurance Society of Montana, September 2014

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*Paul T. Way PE, CFI, CFEI, PI*

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### *Professional Standings, Continued*

#### CONTINUING EDUCATION + TRAINING, CONTINUED

- + Seattle Insurance Seminar, Insurance Society of Oregon, September 2014
- + Seattle Insurance Seminar, Insurance Society of Pennsylvania, September 2014
- + 8th Annual Wildland Fire Litigation Conference, Monterey, 2014
- + Seattle Insurance Seminar, Insurance Society of Philadelphia, 2013
- + Asbestos Awareness Training, RGA Environmental, 2012
- + Hazardous Waste Operations and Emergency Response (24-Hour HAZWOPER) Certification, Compliance Solutions, 2012
- + 13th Annual Fire and Materials Conference, San Francisco, CA, 2013
- + 5th Annual Wildland Fire Litigation Conference, Monterey, 2011
- + The International Symposium on Fire Investigation Science and Technology, University of Cincinnati, 2010
- + International Symposium on Electrical Insulation, IEEE, 2010
- + HVAC Fundamentals I, CASE Forensics, 2008
- + 58th Annual Fire Investigation Scientific Based Training, IAAI, 2007
- + Intensive Course on Electrical Contacts, IEEE, 2004
- + 8th International Fire and Materials Conference, San Francisco, CA, 2003
- + Arctic/Cold Regions Engineering Course, University of Washington, 2002
- + 24th Annual Advanced Fire & Arson Seminar, IAAI Oregon Chapter 31, 2002
- + Refrigeration & Air Conditioning, NTT, Inc., HVAC Division, 2002
- + 7th International Fire & Materials Conference, San Francisco, CA, 2001
- + National Electrical Code Training, National Technology Transfer, 1999
- + EG2404A Telecommunications Grounding for the Autoplex System, Lucent Technologies, 1996
- + Refinery Training Program, Chevron USA, El Segundo, 1987-89



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## 7.0 4-YEAR TESTIMONY HISTORY

<i>Deposition</i>	<i>Mediation</i>	<i>Arbitration</i>	<i>Trial</i>	<i>Court</i>	<i>Case Caption</i>
10/13/22				US District Court, Western District of WA at Seattle	Apodaca v. Eaton Corporation, et al.; David Fitzpatrick and Ryan McDade, Intervention Plaintiffs v. Eaton Corporation; Case No. 2:20- CV-01064 JCC
2/9/22				Superior Court of the State of Washington, King County	Jenelle MacDicken, et al. v. Snohomish County Public Utility District #1 / Grange Insurance Assoc. v. Snohomish County PUD #1; Case No. 19-2-13718-5 SEA
8/27/21				Superior Court of CA, County of Solano	Axenia BioLogix LLC, et al. v. Nor-Cal Beverage Co., Inc. et al.
		7/6/21		Circuit Court of the 2 <sup>nd</sup> Circuit, State of Hawaii	Stacey Riveira v. Maui Electric Company, Limited, et al.
12/11/20				Superior Court of WA, King County	Nam Chuong Huynh, et. v. AKER Biomarine Antacrtic AS, et al. No. 14-2-31832-4 SEA
10/29/20				District Court of Southern District of Texas Houston Division	Zachry Industrial, Inc. v. Three Phase Line Construction Civ. 4:17-cv-03751
9/4/20			11/9/2020	Superior Court of The State of California for the City and County of San Francisco	Schneider Electric, IT USA, Inc., v. Sunbelt Rentals, Inc.; Western Machinery Electric, Inc.; Collicut Energy Services, Inc.; and DOES 1 through 10
7/30/19				District Court of the 5 <sup>th</sup> Judicial District of Idaho, Blaine County	Federal Insurance Company, a/s/o Joyce and Lawrence Lacerte v. Thornton Heating & Sheetmetal, et al.

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## **8.0 TRIAL EXHIBITS**

Jensen Hughes intends to use any figures, photographs, reference material, or appendices reproduced or referenced in this report and any of the documents, photographs, data or drawings obtained or produced during the investigation. In addition, Jensen Hughes may use any subject or exemplar items involved in the Jensen Hughes investigation as a trial exhibit.

## **9.0 COMPENSATION**

Jensen Hughes charges \$450.00 per hour for investigations and \$675.00 per hour for deposition and testimony provided by Paul T. Way, PE.

Other fees and charges are in accordance with Jensen Hughes and Conditions and Fee Schedule.

## **10.0 DOCUMENTS AND MATERIALS RELIED UPON**

Jensen Hughes has relied on each of the documents referenced in this report.